PART I. GENERAL PHYSICS

SECTION II. BIOPHYSICS AND PHYSIOLOGY

ROZENBERG, G.V.

535.393 / 539.23

6545. PRESENT STATE OF THE THEORY OF THE OPTICAL PROPERTIES OF SEMI-TRANSPARENT METAL COVERINGS. G.V.Rozenberg. Uspekhi fiz. Nauk, Vol. 58, No. 3, 487-518 (1956). In Russian.

Review dealing with the structure of those layers and the resulting effective parameters, the Maxwell-Garnett theory, optical properties of a colloidal covering, monomolecular layers. 32 refs. C.R.S.Manders

Rozenberg, G. V.

48-11-2/13

AUTHOR: Rozenberg, G. V.

TITLE: Some Aspects of the Problem of the Spectroscopic Analysis of Light-Dispersing Media and the Reflection-Capacity of Dyed Polydispersed Substances (Nekotoryye aspekty zadachi o spektral'nom analize svetorasseivayushchikh sred i otrazhatel'naya sposobnost' okrashennykh polidispersnykh veshchestv).

PERIODICAL: Izvestiya AN SSSR Seriya Fizicheskaya, 1957, Vol. 21, Nr 11, pp. 1473-1484 (USSR).

ABSTRACT: This report deals with the analysis of substances which are in a dispersed state and which, according to their nature, do not admit the application of absorption methods exclusively. The causes for the difficulties arising are clarified in this report and the ways of surmounting them are pointed out. Besides, the results of the attempt to find a solution for some spectroscopic problems, are given. With respect to the question of taking account of multiple dispersion, it is shown that a separation of the coherent and incoherent part of the reciprocal irradiation of the particles permits to attribute the solution of the statistic problem to the formulation of the socalled transport equation. The coherent part is taken into consideration in the absorption- and dispersion phenomena

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24(4) PHASE I BOOK EXPLOITATION SOV/1142

Rozenberg, Georgiy Vladimirovich

Optika tonkosloynykh pokrytiy (Optics of Thin Films) Moscow, - Fizmatgiz, 1958. 570 p. 4,000 copies printed.

Ed.: Kuznetsova, Ye.B.; Tech. Ed.: Murashova, N.Ya.

PURPOSE: This book is intended for engineers, scientists, postgraduate students and students of advanced optics making and using optical instruments.

COVERAGE: This book gives a detailed survey of theoretical interpretations of interference phenomena in single-layer and multi-layer films and explains the optical properties of various types of film (metallic, dielectric and monomolecular). Their application in the study of optics and the preparation of selective specula, polarizers and optical instruments are described. Special attention is given to the use of interferometers for solving practical problems (with respect to interference light filters, investigating

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the micro-relief of surfaces, determining optical constants, etc.). Many of the considerations, conclusions and results are original and are published here for the first time. No personalities are mentioned. There are 616 references, of which 146 are Soviet, 257 English, 112 French, 76 German, 8 Dutch and 17 Scandinavian.

TABLE OF CONTENTS:

SOV/51-5-4-13/21

AUTHOR: Rozenberg, G.V.

TITLE: Optical Conditions Within a Weakly Absorbing Scattering Medium and Certain Possibilities in Spectroscopy (Svetovoy rezhim v glubine slabopogloshchayushchey rasseivayushchey sredy i nekotoryye vozmozhnosti spektroskopii)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol 5, Nr 4, pp 440-449 (USSR)

ABSTRACT: The author discusses optical conditions within a weakly absorbing isotropic scattering medium. His discussion applies both to electromagnetic waves and to spin $\frac{1}{2}$ particles. It is shown that with increase of specific absorption of the medium the steady-state intensity indicatrix becomes more extended in shape and consequently steady-state polarization of emission appears. Dependence of the emission intensity on depth is given by an exponential law with a decay constant which is not equal to the coefficient of extinction, but which is proportional in the first approximation to the square root of the product of the absorption and extinction coefficients. The constant of proportionality depends on the form of the scattering indicatrix. Spectroscopic

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applications of the formulae obtained are indicated. These applications refer to measurements of the absorption and scattering coefficients, employing a technique similar to that of Timofeyeva (Refs 1-3). There are 5 figures and 18 references, 15 of which are Soviet, 2 German and 1 American.

ASSOCIATION: Institut fiziki atmosfery, AN SSSR (Institute of Physics of the Atmosphere, Academy of Sciences of the U.S.S.R.)

SUBMITTED: January 6, 1958

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1. Optical materials--Effects of radiation 2. Spectroscopy
3. Electromagnetic waves--Properties 4. Nuclear spins

SOV/51-5-6-6/19

AUTHORS: Rozenberg, G.V. and Mikhaylin, I.M.

TITLE: Ellipticity of Polarization of Scattered Light (Ellipticheskost' polyarizatsii rasseyannogo sveta)

PERIODICAL: Optika i Spektroskopiya, 1958, Vol 5, Nr 6, pp 671-681 (USSR)

ABSTRACT: The paper describes experiments on the ellipticity of polarization of light scattered by the ground layers of atmosphere and on dependence of this ellipticity on the scattering angle. A visual polarimeter for measurement of all polarization characteristics of a light beam (degree of polarization, degree of ellipticity, position of the plane of predominant polarization) was constructed. This instrument is based upon the following theory. It is assumed that a light beam may be described by a Stokes vector-parameter S with respect to a certain plane of reference. A compensator is placed in the light beam; it introduces a phase shift τ and is rotated by an angle ψ with respect to the reference plane. Behind the compensator a polarizer, rotated by an angle $\chi = \psi + \varphi$ with respect to the reference plane, and an analyser

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which is rotated by an angle $\zeta = \chi + \delta$ w.r.t. the reference plane, are placed. By selecting various values of ψ and χ and by measurement of the angle η which corresponds to the condition of equal brightness of fields in a Wollaston prism (which is used in the place of a polarizer) one can find the degree of polarization p, the degree of ellipticity q and the angle of rotation of the major axis of the ellipse of polarization with respect to the reference plane ψ_0. The polarimeter was based on a theodolite with a diaphragm of 6° angular diameter. A quarter-wave plate and a Wollaston prism, which could separate two beams by 6°, were placed behind the diaphragm. The vertical plane passing through the optical axis of the theodolite was taken to be the reference plane. Behind the Wollaston prism a polaroid and a long-focus eyepiece were placed. The eyepiece produced a virtual image of the diaphragm. A SZS-16 light filter of 5 mm thickness was used to monochromatize the fields of view to be compared. The error of a single determination of η amounted to ±2°. The error in determination of the degree of ellipticity was less than ±0.03. Measurements were made on moonless nights in the second half of September in mountains of Northern Caucasus (750 m above sea level). Atmospheric aerosols were

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present in very small quantities. A projector, with a reflector of 150 cm diameter and an arc of 11.5 kW power, was used as the source of light. The projector was covered up completely except for an aperture of 40 cm diameter. A polaroid of 40 cm diameter was placed at a distance of 1 m from the projector. A large screen (5 x 5 m) with an aperture of 40 cm diameter was placed at a distance of 8 m from the projector (along the beam). This system produced a sharply defined linearly polarized beam of light at a height of 2 m above the ground level. The polarimeter was placed at 12 m from the screen and 2 m away from the light beam. The results are given in Figs 1-6. The ordinates give q, the degree of ellipticity of the scattered beam, as a function of the scattering angle θ, for various fixed angles ζ between the plane of polarization of the beam and the place of scattering. Fig 1 gives $q(\theta)$ for $\zeta = +45^\circ$ in the absence of mist. Figs 2 and 3 show curves of $q(\theta)$ for $\zeta = +45^\circ$ in a thick haze with a rainbow (curves 1) and in a slight haze (curves 2). The maximum of q, which is characteristic of

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a rainbow, occurs also when no haze is present (Fig 4), probably due to large drops of moisture present in the air. Curves 1 and 2 of Fig 5 were obtained for $\zeta = -45^\circ$ and $\zeta = +45^\circ$ respectively. Fig 6 shows results for $\zeta = 0^\circ$ (open and black dots) and $\zeta = +90^\circ$ (crosses and half-black dots). There are 6 figures and 1 Soviet reference.

SUBMITTED: January 6, 1958

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AUTHOR: Rozenberg, G.V. SOV/51-7-3-17/21

TITLE: Optical Conditions Inside a Medium with Rayleigh Scattering

PERIODICAL: Optika i spektroskopiya, Vol 7, Nr 3, pp 407-416 (USSR)

ABSTRACT: In an earlier paper (Ref 1) the author dealt with the general optical conditions inside a scattering medium with low absorptivity. The general relationships were illustrated by considering the special case of a medium with Rayleigh scattering. The present paper considers further the optical conditions in a medium with Rayleigh scattering; these conditions are a function of the properties of the medium, its absorptivity and depolarization. Various calculation methods are compared and errors due to neglection of the polarization effects are estimated. The possibility of use in spectroscopy of the relationships established here is discussed. As before, the author uses the terminology and mathematical techniques employed earlier to describe the polarization state of a light beam by means of a Stokes' vector-parameter (Ref 2). The paper is entirely theoretical. There are 10 figures and 6 references, 5 of which are Soviet and 1 French.

SUBMITTED: December 2, 1958

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24(4) SOV/2o-122-1-16/44

AUTHORS: Rozenberg, G. V., Mikhaylin, I. M.

TITLE: The Experimental Detection of the Ellipticity of the Polarization of Scattered Light (Eksperimental'noye obnaruzheniye elliptichnosti polyarizatsii rasseyannogo sveta)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 1, pp 62-64 (USSR)

ABSTRACT: The purpose of this paper is to find preliminary data concerning the degree of the ellipticity of light scattered by the lowest layers of the earth atmosphere and concerning the character of its dependence on the scattering angle. A theodolite, in the focal plane of which a diaphragm of the angular diameter 6° was placed, was used as a polarimeter. The authors immediately measured the angles η in which the brightness of both the photometric fields was equal. η denotes the angle of rotation with respect to the vertical direction. The degree of the ellipticity q of the incident light was found by means of the relation $q = (\cos 2\eta_{+} - \cos 2\eta_{-})$. By choosing other values of certain angles, it is possible to determine the degree of the

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The Experimental Detection of the Ellipticity of the Polarization of Scattered Light

polarization of the light and the angle ψ_o of the inclination of the plane of the principal polarization with respect to the vertical direction. The experiments were carried out during moonless nights in the second half of September 1957 on the foothills of the Northern Caucasus. A projector was placed in a comparatively narrow valley, its horizontal light beam was directed along the valley. The carrying out of the experiment (places of the polarimeter etc.) are discussed in short. Because of the comparative pureness of the air, the scattered air was rather faint, and the visual methods took a long time and were not very precise. According to theoretical considerations an ellipticity of the polarization of the scattered light will be observed only as a result of the scattering on an aerosol and it will have a maximum for $\xi = \pm 45^{\circ}$, if the irradiating beam is linearly polarized in a direction which includes the angle ξ with the plane of scattering. The ellipticity distinctly depends on the scattering angle, approximately satisfying the relation $\sim \cos 3\,\theta$. In the extrema $q \sim 0,1$ which is not a low value. A second diagram shows the function $q(\theta)$ for 2

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cases of more or less dense fog. A zone of irridescence ($\theta = 130 - 140^{o}$) (in which $q \sim 0,5$) and a change of the sign of q in the region $\theta \sim 40 - 90^{o}$ were observed. Sometimes, the irridescent region was observed also in cases without an actual fog. This is an argument in favor of the presence of an aerosol fraction consisting of large drops in the air. The values of the degree of polarization were within the limits 0,68 - 0,76. From a theoretical point of view, the ellipticity of the polarization of the scattered light is not a surprising phenomenon. There are 3 figures and 1 Soviet reference.

PRESENTED: March 8, 1958, by V. V. Shuleykin, Academician

SUBMITTED: March 2, 1958

24(7) SOV/2o-122-2-13/42

AUTHOR: Rozenberg, G. V.

TITLE: The Light Distribution Inside a Dispersing Medium and the Spectroscopy of Dispersed Substances (Svetovoy rezhim v glubine rasseivayushchey sredy i spektroskopiya dispergirovannykh veshchestv)

PERIODICAL: Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 2, pp 211-214 (USSR)

ABSTRACT: V. A. Timofeyeva found some empirical laws which may be important for the absorption spectroscopy of dispersed substances. This paper deals with the theoretical explanation and with the improvement of some of these laws. Since the polarization effects have to be taken into account, the author uses the terminology and the calculation methods which are used for the description of a polarized light beam by means of the vector parameter of Stokes (Stoks). The lower half-space $Z > 0$ is assumed to be filled up with a homogeneous isotropic scattering medium and to be lighted from the upper half-space $Z < 0$. In the case of an isotropic medium, the scattering matrix must have certain integral properties, the correspond-

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ing formulae are given by the author. The propagation of the light (or of particles with spin 1/2) is described by a transfer equation . According to physical considerations, a steady distribution of light must exist inside the scattering medium in a sufficient distance from its boundary. The angular distributions of the components S_i of the vector parameter of Stokes do not depend on the distance from the surface, on the inclination angle, and on the polarization character of the light flows falling upon the external boundary of the medium. Simultaneously, the azimutal dependence of S_i must vanish. The author then step by step gives the calculation operations which correspond to the above-discussed considerations. Inside the substance, $S_i(z)$ must be an exponential function. The damping coefficient does not depend on the direction of the beam. Then a formula is given for the radiation flux through a horizontal cross section. Then the light distribution for the case $\gamma \ll 1$ is investigated. There is $\gamma \equiv k'/k$ where $k = \alpha + \sigma$; α denotes the absorption coefficient and σ - the scattering coefficient. k' denotes the damping coefficient inside the substance. Expressions are derived for

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the intensity, for the degree of polarization, for the degree of ellipticity, and for the angle of the inclination of the plane of the preferred polarization. In the first approximation, the degree of the polarization and the degree of the ellipticity must be proportional to γ. One of the principal difficulties in the development of the spectroscopy of the dispersing substances is the necessity of the separate determination of α and σ of the scattering medium. It is possible that further theoretical and experimental investigations will give a solid basis for the development of the spectral analysis of the absorption of dispersing substances. There are 3 references, 3 of which are Soviet.

PRESENTED: April 17, 1958, by V. V. Shuleykin, Academician

SUBMITTED: April 17, 1958

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"Some Possibilities of Experimental Determination of the Spectrum of True Absorption by Clouds and Fogs."

paper presented at Symposium on Radiation and Atmospheric Ozone, Oxford, UK, 20-26 July 1959

SOV/26-59-8-13/51

3(7), 24(4)

AUTHOR: Rozenberg, G.V., Professor

TITLE: Problems of Atmospheric Optics (On the Results of the All-Union Conference on Actinometry and Atmospheric Optics)

PERIODICAL: Priroda, 1959, Nr 8, pp 68-70 (USSR)

ABSTRACT: In January 1959, a conference on actinometry and atmospheric optics was held at Leningrad. More than 300 people participated and the convention heard 102 reports. The author stated that the research of radiation in the Arctic and Antarctic regions has shown an increase of radiation balance during the summer months. He also stated that the research on spectral actinometry and actinometry in the free atmosphere will be continued. In the Laboratoriya aerometodov AN SSSR (Laboratory of Air Methods at the AS of the USSR) a self-recording "spektrovizor" has been developed; it is an instrument which can receive dozens of spectral reflections of the earth's surface per second from a plane. The author also

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mentions the fact that the air is neither "clean" in the stratosphere nor in the troposphere. In both layers, the air is dimmed by aerosol. The research of optical characteristics of the atmosphere carried out at certain heights and with the help of instruments aboard aircraft or on automatic stratostats has shown interesting results. The dimness of the atmosphere is very intense at a height of 1,000 m. From 3,000 to 5,000 m it is less intense . The dimness of the atmosphere abruptly decreases in the upper layers. Especially valuable conclusions can be obtained from the transfer of radiation (visible and infrared) in the atmosphere and in the clouds.

ASSOCIATION: Institut fiziki atomsfery Akademii nauk SSSR/Moskva (Institute of Physics of the Atmosphere at the AS of the USSR/Moscow).

ROZENBERG, G.V.

Light conditions inside a medium in connection with Rayleigh scattering. Opt. i spektr. 7 no.3:407-416 S '59. (MIRA 13:3)
(Light--Scattering)

3 (3), 3 (7)

AUTHORS: Kondrat'yev, K. Ya., Rozenberg, G. V. SOV/53-68-2-6/7

TITLE: Conference on Actinometry and Atmospheric Optics (Soveshchaniye po aktinometrii i atmosfernoy optike)

PERIODICAL: Uspekhi fizicheskikh nauk, 1959, Vol 68, Nr 2, pp 345-358 (USSR)

ABSTRACT: The conference on actinometry and atmospheric optics, that had been organized by the Committee of Atmospheric Optics of the OFMN AS USSR, by the Leningrad University and the Glavnaya geofizicheskaya observatoriya (Geophysical Main Observatory) was held in Leningrad from January 28 to February 4, 1959. Preparatory work was made by a subcommittee for radiation of the Committee of [illegible] Physics of the Atmosphere, to which belonged: K. Ya. Kondrat'yev (Chairman, LGU Leningrad), G. V. Rozenberg (Vice President IFA AS USSR, Moscow), V. G. Kastrov (TsAO, Moscow), Ye. V. Pyaskovskaya-Fesenkova (Astrofiz. in-t - Astrophysics Institute, KazakhSSR, Alma-Ata), G. K. Sulakvelidze (Elbrus Expedition of the IPG AS USSR, Nal'chik), K. S. Shifrin (GGO, Leningrad), Yu. D. Yanishevskiy (GGO, Leningrad). The conference was attended by 325 delegates from 33 cities, astronomical

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observatories and actinometric stations. Other delegates had been sent by China, Poland, East Germany, Czechoslovakia, Bulgaria and Korea. 102 lectures were delivered, which may be classified in the following groups with respect to their subjects: 1) Radiation equilibrium and its composition, 2) Brightness and polarization of daytime- and crepuscular sky, 3) Atmospheric transparency, 4) Investigation of the atmospheric aerosol by optical methods, 5) Reflecting capability of lower strata, 6) .... The conference was opened by the Chairman of the Committee of Atmospheric Physics, A. M. Obukhov, Corresponding Member, AS USSR. K. Ya. Kondrat'yev (LGU, Leningrad) held an introductory speech on results and prospects of development in actinometry and atmospheric optics. G. V. Rozenberg (IFA, AS USSR, Moscow) spoke on the development of atmospheric optics and Yu. D. Yanishevskiy (GGO, Leningrad) on the actinometric network of the USSR and the IGY. S. I. Sivkov (GGO, Leningrad) spoke on actinoclimatology, L. G. Makhotkin (GGO, Leningrad) on the systematic arrangement of data in actinometry and P. A. Vorontsov and T. V. Kirillova (GGO, Leningrad) on the connection of radiation equilibrium with the stratification

of the earth-near stratum. Further lectures were delivered by: Ye. P. Barashkova (GGO, Leningrad) on rules governing the radiation conditions, L. I. Sakali (GMI, Odessa) on radiation equilibrium in the lower strata over land and sea, K. Ya. Kondrat'yev and M. P. Manolova (LGU, Leningrad) on the radiation equilibrium in slopes, F. Zakrilayev (Tashkent) on the development of actinometry and atmospheric optics in Central Asia, A. I. Kartsivadze (Institut geofiziki AN GruzSSR - Institute of Geophysics of AS GruzSSR, Tbilisi) on the determination of the angle of incidence of sun beams on inclined planes, Sh. M. Chkhaidze (Abastumanskaya astrofiz. obs. - Abastumani Astrophysical Observatory) on astrophysical observations made in this observatory, T. G. Berlyand (GGO, Leningrad) on the propagation of sun radiation over the globe, Ye. P. Barashkova, V. L. Gayevskiy and Z. I. Pivovarova (GGO, Leningrad) on radiation conditions in the European part of the USSR, and N. A. Yefimova (GGO, Leningrad) on the application of climatological methods of calculating the effective total radiation, and utilization of data from 68 actinometric stations of the USSR. B. M. Gal'perin (LGMI, Leningrad) spoke of the influence exerted by an overcast

upon the thermal irradiation of atmosphere and R. Ye. Borichevskiy (Agrometstantsiya, Omsk) on the work carried out by this station; A. I. Popov (Sel'skokhoz. in-t, - Agricultural Institute, Krasnoyarsk) spoke of the total and scattered radiation in the Krasnoyarskiy kray, V. V. Mukhenberg and T. A. Ogneva (GGO, Leningrad) reported on local radiation investigations (Crimea). S. I. Sivkov (GGO, Leningrad) spoke about actinometry in agriculture and N. P. Rusin (GGO, Leningrad) spoke about investigations of radiation equilibrium made by the Soviet Antarctic Expedition. V. N. Bogoslovskiy (MISI, Moscow) reported on thermophysical and glacial-actinometric investigations in the Antarctica 1957-1958 and N. T. Chernigovskiy (ANII, Leningrad) as well as M. K. Gavrilova (Yakutsk), B. M. Gal'perin (LGMI, Leningrad), T. V. Kirillova (GGO, Leningrad) and M. S. Marshunova (ANII, Leningrad) likewise reported on actinometric and climatological investigations in the Antarctica. V. S. Samoylenko (NII aeroklimatologii - Scientific Research Institute of Aeroclimatology, Moscow) reported on investigations of the radiation thermal conductivity in the sea and the atmosphere, and together with A. I. Sirotkina on

problems of solar irradiation and water temperature in the Aral and Caspian Sea. A number of lectures on the subject: radiation and construction engineering was introduced by A. U. Franchuk (In-t stroitel'stva i arkhitektury AN BSSR, Minsk - Institute of Construction Engineering and Architecture, AS BSSR, Minsk) with a lecture on the influence of solar radiation upon the external surfaces of buildings. Further lectures were delivered by: B. F. Vasil'yev (NII zhilishcha AS i A SSSR, Moscow) on the role played by the reflected radiation in the southern regions of the USSR, B. A. Dunayev on the consideration of radiation when projecting buildings, as well as Ye. Yu. Braynina, A. N. Borshchevskiy (NII-200, Moscow) likewise on architectural problems in connection with radiation. The following reports dealt with problems of actinometric measurement: Yu. D. Yanishevskiy (GGO, Leningrad) on construction principles of Soviet and foreign actinometric instruments, and on the compensation pyrheliometer and its application, E. L. Podol'skaya (LGU, Leningrad) on the theory of the balansometer, Yu. K. Ross (In-t fiziki i astron. AN ESSR, Tartu - Institute of Physics and Astronomy of the AS ESSR, Tartu) spoke of the application of electronic

potentiometers in actinometry and V. I. (Mamayenko IFA AS USSR, Moscow) on the application of the instrument EPP-09 for radiation recording, F. Zakrilayev (Sredneaz. politekhn. in-t, - (Soviet) Central Asiatic Polytechnic Institute, Tashkent) on temperature coefficients of actinometric instruments, R. Ye. Borichevskiy (Agrometstantsiya, Omsk) on new apparatus, observation methods and utilization of materials in the Omsk agrometstantsiya. Other lectures were delivered by: D. L. Grishchenko on methods of maritime actinometric observations, Ye. V. Pyaskovskaya-Fesenkova (Alma-Ata) on visual observations of polarization of the day-light in the Libyan Desert and D. G. Stamov (Krymsk. pedagogich. in-t - Crimea Pedagogical Institute, Simferopol') on the polarimetric determination of the moisture of atmosphere in different directions. S. I. Sivkov (GGO, Leningrad) reported on depolarization phenomena of light in the atmosphere, Yu. N. Lipskiy (GAISh MGU, Moscow) on the spectral polarization of the day- and crepuscular sky, N. K. Turikova, A. Ya. Driving, G. V. Rozenberg (IFA AS USSR, Moscow) reported on photoelectric investigations of the brightness

of day- and crepuscular sky in the Northern Caucasus and on the Crimea; T. G. Megrelishvili (Abastuman Astrophysical Observatory) reported on investigations of optical properties of the earth atmosphere in crepuscle. G. V. Rozenberg spoke of the "Anatomy of Sunset", A. D. Zamorskiy (Leningrad) of the physical nature of the phenomena in the pink-red (purple) sky at sunset, M.M. Fedorov (Pedagogich. in-t - Pedagogical Institute, Zaporozh'ye) on illumination and density of damp in the Zaporozh'ye region, V. V. Sharonov (LGU, Leningrad) on the determination of light constants of the sun and the moon, T. P. Toropova (Alma-Ata) on factors of light reduction in the atmosphere, N. V. Zolotavina (IFA AS USSR) on measurements of the transparency of the atmosphere, M. V. Dolidze (Abastumani Astrophysical Observatory) on measurements of spectral transparency on the mountain Kanobili. Further lectures dealt with the altitude dependence of transparency: V. G. Kastrov (TsAO, Moscow) spoke about the pyranometric determinations of the sunlight absorption in the atmosphere, G. P. Faraponova (TsAO, Moscow) on light reduction in the free atmosphere, Yu. I. Rabinovich (GGO, Leningrad) on the

vertical distribution of the reduction coefficient in the lower troposphere, G. P. Gushchina (GGO, Leningrad) on the irradiation of atmospheric aerosols, V. I. Myukhkyur'ye on the light reduction by aerosols at different altitudes, Ye. V. Pyaskovskaya-Fesenkova (Alma-Ata) on the determination of transparency coefficients from the brightness of the sky, N. I. Nikitinskaya (Lesotekhnicheskaya Akademiya - Technical Academy for Forestry, Leningrad) on determinations of the spectral transparency of the atmosphere, Ye. A. Polyakova (GGO, Leningrad) on the horizontal transparency in a precipitation zone, O. I. Popov (GOI, Leningrad) on the photoelectric recording instrument GOI (FM-45), A. M. Brounshteyn (GGO, Leningrad) on methods and measuring results concerning the function of the passage of longwave radiation, V. A. Zuyev on the horizontal transparency of the atmosphere for infrared, A. L. Osherovich (LGU, Leningrad) on parameters of modern photomultipliers and photocells, A. P. Andreytsev and O. P. Shelkova (In-t biofiziki AN SSSR - Institute of Biophysics of the AS USSR, Moscow) dealt with an instrument devised by them for the measurement of natural UV-radiation, N. F. Galanin (In-t radiats. gigiyeny -

Institute of Radiation Hygiene, Leningrad) on the effect of UV-radiation on the human organism, A. N. Boyko (VNIIM, Leningrad) on the UV-radiation of the sun as a climatic factor, N. A. Lebedev (Crimea Pedagogical Institute, Simferopol') on observations of the solar UV-radiation on the Crimea. Problems of atmospheric aerosols were dealt with by K. S. Shifrin and V. F. Raskin (GGO, Leningrad), O. D. Bartenev (GGO, Leningrad), T. P. Toropova (Alma-Ata), B. A. Chayanov (TsAO, Moscow), G. V. Rozenberg, N. D. Rudometkina and I. M. Mikhaylin (IFA AS USSR, Moscow); reports chiefly dealt with investigations of the scattering indicatrix and its components. N. V. Zolotavina, A. Ya. Driving and G. V. Rozenberg (IFA AS USSR, Moscow) spoke about atmospheric sounding, A. Ya. Driving (IFA AS USSR) on clouds in the stratosphere according to sounding data, B. I. Styro (In-t geologii i geografii AN Litovskoy SSR - Institute of Geology and Geography, AS Lithuanian SSR) on the distribution of radioactive aerosols in the free atmosphere, L. B. Krasil'shchikov (GGO, Leningrad) on measurements of brightness coefficients under laboratory conditions and in the open air, K. S. Lyalikov (Labor. aérometodov AN SSSR - Laboratory for

Aeromethods of the AS USSR, Leningrad) on investigations of the spectral brightness, V. I. Matulevichene (Gos. universitet, Vil'nyus - State University, Vilna) on albedo-measurements and computations, N. Ye. Ter-Markaryants (GGO, Leningrad) on radiation reflection by the sea, K. Ya. Kondrat'yev, Z. F. Mironova and L. V. Dayeva on the spectral albedo of snow, Kh. G. Toominga (Tartu, on the course of the surface albedo during one day and N. I. Goysa (Ukr. NIGMI, Kiyev) on albedo measurements of large territories by the aid of an airoplane. Other lectures were devoted to problems of the radiation transfer in the atmosphere. Lecturers were: K. Ya. Kondrat'yev (LGU, Leningrad) on approximation equations for the radiation energy transfer, Ye. M. Feygel'son (IFA AS USSR, Moscow) on temperature changes in a cloud with time, A. M. Samson (In-t fiziki i matematiki AN BSSR - Institute of Physics and Mathematics AS BSSR, Minsk) on the transfer of resonance radiation in a plane-parallel stratum, I. N. Minin (LETI, Leningrad) on a radiation transfer equation under consideration of refraction, G. V. Rozenberg (IFA AS USSR, Moscow) on light conditions in the depth of a scattering medium, S. G. Slyusarev (LGMI, Leningrad) on the

radiation field in the depth of a turbid medium, M. S. Malkevich (IFA AS USSR, Moscow) on results given by an approximation method devised by him for the consideration of the horizontal albedo change of the ground surface in the problem of light propagation in the atmosphere with a spherical scattering indicatrix, S. D. Gutshabash (VMU, Leningrad) on light scattering in a medium adjacent to a reflecting surface, V. A. Atroshenko (IFA AS USSR, Moscow) on evaluations of the accuracy of the transfer equation solution according to the method by V. V. Sobolev and O. A. Avaste (In-t fiz. i astron. AN ESSR, Tartu - Institute of Physics and Astronomy of the AS ESSR, Tartu) concerning the accuracy of an approximation method for the calculation of the brightness in atmospheric fog (Sobolev method). The next conference of this kind is to be held in Vilna in 1960.

24(7)
AUTHOR: Rozenberg, G. V. SOV/53-69-1-3/11

TITLE: Absorption Spectroscopy of Dispersed Substances (Absorbtsionnaya spektroskopiya dispergirovannykh veshchestv)

PERIODICAL: Uspekhi fizicheskikh nauk, 1959, Vol 69, Nr 1, pp 57-104 (USSR)

ABSTRACT: This is the first part of the very detailed survey, which deals with the theoretical conditions of absorption spectroscopy. Its part consists of 14 sections. The introduction gives a survey of the problems; among other things it is pointed out that at present about 1000 publications exist which deal with the spectroscopy of dispersed substances. In the following the optical properties of an isolated particle and their mathematical representation; a number of mathematical quantities and symbols (scattering matrix, Stokes parameter, etc) are introduced, defined, and some examples are discussed. Section 3 deals with cooperative effects; the representation of the diffraction of electromagnetic waves on small particles is carried out according to L. I. Mandel'shtam. Section 4 is devoted to multiple scattering; the Stokes transfer equation is written down according to Refs 1, 2 (Rozenberg) and its statement is discussed. Section 5 deals with the general

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problem of propagation and radiation in radiating media, and, in connection with the transfer equation, the spectroscopy in dispersing media and the experimental conditions. Section 6 deals with light propagation in the depth of a colored medium (V. A. Timofeyeva et al.). Section 7 gives a theoretical representation of the reflection of electromagnetic waves on the surface of a scattering medium in the case of very strong absorption. Section 8 deals with the albedo of scattering media in the case of weak interaction, 9 with the transmission of optically thin layers and with the measurement of the extinction coefficient. Figure 7 is a schematical representation of an experimental arrangement for the measurement of the transparency of a layer of scattering matter, which is discussed in the following. In section 10 the aforementioned transfer equation and the possibility of its solution are discussed. A number of polar diagrams of brightness at various depths is given and discussed. Section 11 deals with the investigation of the interrelation between transmission and reflectivity of a layer; a function occurring in the equations is tabulated. Sections 12 and 13 finally deal with model representations and the transformation of the differential equations dealt with by

the last section into equations with finite differences, as well as the part played by the boundaries of the scattering media are dealt with. Section 14 contains some final remarks. The following Soviet scientists are mentioned: K. S. Shifrin, E. V. Shpol'skiy, A. A. Il'ina, A. P. Prishivalko, B. I. Stepanov, Yu. I. Chekalinskaya, V. A. Malyshev, Ye. O. Fedorova, L. I. Mandel'shtam, A. I. Kalyadin, N. A. Voyshvillo, M. V. Vol'kenshteyn, V. V. Sobolev, V. A. Timofeyeva, V. A. Ambartsumyan, M. V. Maslennikov, S. G. Slyusarev, Ye. S. Kuznetsov, A. S. Toporets, M. M. Gurevich, G. A. Gamburtsev, V. G. Kastrov, A. N. Gordov, K. Ya. Kondrat'yev, A. A. Gershun, O. P. Girin, V. V. Antonov-Romanovskiy, A. P. Ivanov, V. Ginzburg, V. Pul'ver, V. Fabrikant, L. D. Landau, and Ye. M. Lifshits. There are 11 figures, 1 table, and 98 references, 62 of which are Soviet.

PHASE I BOOK EXPLOITATION SOV/5019

Georgiyevskiy, Yu. S., A. Ya. Driving, N. V. Zolotavina, G. V. Rozenberg, Ye. M. Feygel'son and V. S. Khazanov

Prozhektornyy luch v atmosfere; issledovaniya po atmosfernoy optike (Searchlight Ray in the Atmosphere; Investigations in Atmospheric Optics) Moscow, Izd-vo AN SSSR, 1960. 243 p. Errata slip inserted. 1,600 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut fiziki atmosfery.

Ed. (Title page): G. V. Rozenberg, Professor; Ed. of Publishing House: N. L. Telesnin; Tech. Ed.: I. F. Koval'skaya.

PURPOSE: This book is intended for geophysicists concerned with searchlight sounding of the atmosphere and questions in atmospheric optics.

COVERAGE: The book reports on recent investigations of the effect of atmospheric conditions on the visibility of distant objects illuminated by a searchlight, and the utilization of a searchlight beam for investigations in atmospheric optics. The authors limit themselves to that side of the problem directly

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connected with atmospheric conditions, but give a sufficiently detailed review of present-day data on the optical properties of the atmosphere. Attention is concentrated on studies made by the authors and their colleagues at the Laboratoriya atmosfernoy optiki Instituta fiziki atmosfery Akademii nauk SSSR (Laboratory of Atmospheric Optics of the Institute of Physics of the Atmosphere AS USSR). No personalities are mentioned. There are 173 references: 100 Soviet, 38 English, 25 German, and 10 French.

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AVAILABLE: Library of Congress
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5-2-61

S/053/60/071/02/01/011
B006/B017

AUTHOR: Rozenberg, G. V.

TITLE: Light Scattering in the Earth's Atmosphere (Essay on the Occasion of the 150th Anniversary of Arago's Discovery of the Polarization of Light of the Diurnal Sky and on the Occasion of the 100th Anniversary of Govi's Discovery of the Polarization of Light in Scattering)

PERIODICAL: Uspekhi fizicheskikh nauk, 1960, Vol. 71, No. 2, pp. 173-213

TEXT: The first two paragraphs of this very comprehensive article give a historical representation of the above discoveries (and of some others connected with them). In Chapter 3 the polarization of light is generally and theoretically formulated according to Stokes. The author then passes on to scattering and the resulting polarization, and the theory is briefly outlined by a matrix representation. Chapter 4 deals with the permeability of the atmosphere in the individual spectral ranges and their directional dependence as well as the optical density of the atmosphere, absorption of light passing through the atmosphere and, finally, he

briefly deals with the aerosol theory. Fig. 4 shows the lines of the same optical thicknesses for an ideally pure atmosphere in the coordinates altitude - wavelength. Fig. 6 illustrates the dependence of the altitude of the mean attenuation coefficient at various geographic places, Fig. 7 shows the dependence of the mean vertical optical densities of the atmosphere on the respective altitudes. These were measured on mountain slopes (for 400, 550, and 600 mμ). Fig. 8 illustrates the diurnal fluctuations of the aerosol component of the vertical optical density of the atmosphere in different parts of the spectrum. Chapter 5 gives a description of the directions of polarized light distribution of the sky (Arago, Babinet and Brewster points, etc) and the discovery of this effect by Arago. Furthermore, problems of molecular anisotropy and multiple scattering in the atmosphere are discussed. Fig. 10 shows the dependence of the degree of polarization of light of the sky on the scattering angle, recorded at different times on various days around the

autumnal equinoxes. Fig. 11 shows the correlation between maximum polarization and vertical permeability of the atmosphere. Experimental results obtained by a great number of researchers are briefly discussed. In Chapter 6, results of measurement of the distribution of brightness on the diurnal sky are discussed, and comparisons with a scattering function are given (Figs. 14-16). Some details are discussed concerning the angular dependence of brightness and the degree of polarization. In Chapter 7, the optical probing of the atmosphere and its results are discussed as well as problems of interpreting experimental data. From 1944 to 1958 some 100 optical sections of the atmosphere were produced at the Laboratoriya atmosfernoy optiki Instituta fiziki atmosfery AN SSSR (Laboratory for the Optics of the Atmosphere of the Institute of Physics of the Atmosphere of the AS USSR) by projective probing according to various methods. Chapter 8 briefly deals with the distribution of light in clouds and fog and the problems connected therewith. Chapter 9 is

Light Scattering in the Earth's Atmosphere (Essay on the Occasion of the 150th Anniversary of Arago's Discovery of the Polarization of Light of the Diurnal Sky and on the Occasion of the 100th Anniversary of Govi's Discovery of the Polarization of Light in Scattering)

S/053/60/071/02/01/011
B006/B017

devoted to some problems of radiation climatology and aerosol optics. The following Soviet personalities are mentioned: V. V. Shuleykin, V. V. Sobolev, Ambartsumyan, L. I. Mandel'shtam, Toropova, S. F. Rodionov, I. I. Tikhanovskiy, Turikova, Yu. N. Lipskiy, Ye. V. Pyaskovskaya-Fesenkova, V. G. Kastrov, Ye. S. Kuznetsov, O. D. Barten'yeva, Rudometkina, I. M. Mikhaylin, K. S. Shifrin, V. G. Fesenkov, I. A. Khvostikov, Brounov, and M. Minnart. There are 21 figures and 99 references: 46 Soviet, 1 Italian, 1 Belgian, 21 German, 14 British, 10 French, and 6 American.

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S/169/62/000/003/038/098
D228/D301

AUTHOR: Rozenberg, G. V.

TITLE: The courses of the development of atmospheric optics

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 3, 1962, 11-12, abstract 3B97 (Vsb. Aktinometriya i atmosfern. optika, L., Gidrometeoizdat, 1961, 9-15)

TEXT: The author gives a historical review of the development of atmospheric optics and of its present-day state to the moment of the separation of actinometry and aeronomy from this branch of science. The further accumulation of general data on atmospheric optics would seem to serve no useful purpose in the meteorologic aspect, but statistical investigations of the atmosphere's optical properties should be accomplished by means of a widely ramified system of simple and cheap instruments with the aim of creating optical climatology. It is recommended that in contemporary atmospheric optics attention should be focussed on the study of the physical nature and the basic mechanisms of the phenomena

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The courses of ...

of the scattering and the diffusion of light in the atmosphere. The complexity of atmosphero-optical phenomena and the intricacy of their relations to the meteorologic situation requires a series of investigations (both experimental and theoretical). For geophysical institutions the need for laboratory research is also proposed. A list of problems, which are most important from the viewpoint of organizing systematic or complex investigations, is given in conclusion. [Abstracter's note: Complete translation.]

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3,5120

AUTHOR: Rozenberg, G. V.

TITLE: The anatomy of glow (Theses)

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 3, 1962, 17, abstract 3B144 (V sb. Aktinometriya i atmosfern. optika, L., Gidrometeoizdat, 1961, 105-107)

TEXT: In view of the complexity of the twilight theory the role of different factors, determining the formation of dusk and dawn phenomena, is considered for analysis of experimental data. An expression is also derived for the color-equivalent of the crepuscular sky in the sun's vertical at not too great zenith distances of the sighting direction. A special program of observations permits determination of the altitude changes of the relative indicatrix of scattering, the dispersion of the heights of the earth's shadow as a function of the wavelength of light and the height od the earth's shadow, and also the spectral relationship of the atmosphere's dispersion capacity. [Abstracter's note: Complete translation.]

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3.5150

S/169/62/000/003/052/098
D228/D301

AUTHORS: Rozenberg, G. V., Rudometkina, N. D. and Mikhaylin, I. M.

TITLE: Angular relation of the matrix of dispersion of atmospheric light (Theses)

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 3, 1962, 27, abstract 3B219 (V sb. Aktinometriya i atmosfern. optika, L., Gidrometeoizdat, 1961, 215-216)

TEXT: The components of the matrix of dispersion for atmospheric air were determined experimentally. The observations were made on the foothills of the North Caucasus in September 1957. Photographic and visual measurement procedures were used. Some persistent features of the angular relations of the dispersion matrix components which are characteristic for the presence or absence of fog, are mentioned. The marked ellipticity of the polarization of scattered light was established. [Abstracter's note: Complete translation.]

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3,5150

S/169/62/000/003/054/098
D228/D301

AUTHORS: Driving, A. Ya., Zolotavina, N. V. and Rozenberg, G.V.

TITLE: Some results of work on atmospheric searchlight probing (Theses)

PERIODICAL: Referativnyy zhurnal, Goefizika, no. 3, 1962, 27, abstract 3B221 (V sb. Aktinometriya i atmosfern. optika, L., Gidrometeoizdat, 1961, 217-218)

TEXT: When using photographic and photoelectrical methods of investigating the atmosphere with a searchlight beam, it was found that aerosols occur in the stratosphere's lower layers as well as in the troposhere. This indicates that assumptions about the Rayleigh character of light scattering in the stratosphere are not well-founded. It was also established that, as a result of the atmosphere's instability, the experimentally derived curves of the change in the searchlight beam's brightness with altitude differ from the data, calculated theoretically for the experiment's cor-

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Some results of work ...

responding geometry, by a factor of three. [Abstracter's note: Complete translation.]

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3.5150

AUTHOR: Rozenberg, G. V.

TITLE: Light regime deep in a dispersion medium (Theses)

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 3, 1962, 27, abstract 3B223 (V sb. Aktinometriya i atmosfern. optika, L., Gidrometeoizdat, 1961, 251-252)

TEXT: Correlations were derived for a stationary light regime which is independent of the boundary conditions and is determined solely by the properties of the environment itself, deep in a dispersion medium. The correlations were corroborated well by experiments. [Abstracter's note: Complete translation.]

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ROZENBERG, G.V., prof.

Tamed mirages. Znan. ta pratsia no.3:17-18 Mr '62.
(MIRA 16:7)

1. Zaveduyushchiy laboratoriyey atmosfernoy optiki Instituta fiziki atmosfery AN SSSR.
(Mirages) (Atmospheric acoustics)

ROZENBERG, G.V., doktor fiziko-matem.nauk

Mystery of sunset. Nauka i zhizn' 29 no.7:66-70 Jl '62.
(MIRA 16:6)

1. Zaveduyushchiy laboratoriyey atmosfernoy optiki Instituta fiziki atmosfery AN SSSR.

(Sunset phenomena)

40088
S/020/62/145/004/013/024
B178/B102

243200

AUTHOR: Rozenberg, G. V.

TITLE: Light characteristics of thick layers of scattering media with low specific absorption

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 145, no. 4, 1962, 775-777

TEXT: The exact solution of the transport equation gives

$$R_\infty(\vec{r},\vec{r}_0) = \sum_1^\infty a_n(\vec{r},\vec{r}_0)\,(1+\beta)^{-n} \qquad (1)$$

for the brightness ratio $R = I/I_0\omega_0$ in a semibounded medium where I_0, I is the brightness of the incident and the reflected light; $\vec{r}_0\vec{r}$ are unit vectors; ω_0 is the angular resolution of the incident ray; $a_n(\vec{r},\vec{r}_0)$ depend on the form of the scattering matrix $f_{ik}(\vec{r},\vec{r}_0)$; $\beta = \alpha/\sigma$ is the specific absorption of the medium; α, σ are volume coefficients of absorption and scattering; n is the multiplicity of scattering. With $\beta \ll 1$,

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Light characteristics of thick...

$$R_\infty(\vec{r},\vec{r}_0) \cong \frac{\mu_0}{\pi} h(\vec{r},\vec{r}_0) \exp\left[-s(\vec{r},\vec{r}_0)\eta\sqrt{\beta}\right] \qquad (3)$$

is obtained. Albedo, R, and the transmissivity, T, are got by introducing $y = \eta\sqrt{\beta}$; $x = \xi\tau^* = \frac{\nu}{1}\tau^*$; $l = 4q$, where τ^* is the optical density of the layer,

$$T = \frac{\operatorname{sh} y}{\operatorname{sh}(x+y)}; \quad R = \frac{\operatorname{sh} x}{\operatorname{sh}(x+y)}, \qquad (5)$$

and

$$t \equiv \frac{I_\omega}{I_0\omega_0} = \frac{\omega}{\pi}\mu_0 g(\mu_0)g(\mu)\frac{\operatorname{sh} y}{\operatorname{sh}(x+y)} + \begin{cases} \exp(-\tau^*/\mu_0)\,\delta_{r,r_0} & (\omega \geqslant \omega_0), \\ \frac{\omega}{\omega_0}\exp(-\tau^*/\mu_0)\,\delta_{r,r_0} & (\omega \leqslant \omega_0) \end{cases} \qquad (6)$$

where δ_{r,r_0} is the Kronecker symbol;

$$R(r, r_0) = \frac{\mu_0}{\pi}\left[h(r, r_0)\exp[-s(r, r_0)\,y] - g(\mu_0)\,g(\mu)\frac{e^{-x-y}\operatorname{sh} y}{\operatorname{sh}(x+y)}\right]. \qquad (7)$$

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(9)

Light characteristics of thick...

is obtained with quasidiffuse light. If $\beta = KQK$, where K is the form factor of the particles, K is the absorption coefficient of the medium, then

$$R_\infty(r, r_0) = \frac{\mu_0}{\pi} h(r, r_0) \exp[-s(r, r_0)\,\eta\sqrt{K\rho\varkappa}]. \quad (15)$$

PRESENTED: February 26, 1962, by V. G. Fesenkov, Academician

SUBMITTED: January 27, 1962

ROZENBERG, G.V.

Limits of the applicability of Buger's law and the reversion effects of anomalous and "selective" transparency of the atmosphere. Dokl.AN SSSR 145 no.6:1269-1270 Ag '62.
(MIRA 15:8)

1. Predstavleno akademikom V.G.Fesenkovym.
(Atmospheric transparency)

AM4008919 BOOK EXPLOITATION S/

Rozenberg, Georgiy Vladimirovich

Twilight (Sumerki) Moscow, Fizmatgiz, 1963. 0380 p. illus., biblio., index. 3,500 copies printed.

TOPIC TAGS: twilight, twilight sky, twilight sky spectrophotometry, twilight sky polarimetry, earth atmosphere, earth atmosphere optics, air optics, twilight layer, twilight ray, earth shadow

PURPOSE AND COVERAGE: This monograph is the first review in the world literature devoted to twilight as an optical phenomenon and as one of the means of atmospheric research. It presents a general outline of the present status of Soviet and other work, along with original results obtained by the author and his co-workers. An appreciable part of the book is devoted to the work done at the Laboratory of Atmospheric Optics of the Institut fiziki atmosfery* AN SSSR (Institute of Physics of the Atmosphere, AN SSSR), along with

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some experimental data obtained in the same laboratory in recent years. The book is for scientists and for graduate and undergraduate university students who specialize and work in the field of geophysics.

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45080

S/051/63/014/001/021/031
E032/E514

AUTHORS: Germogenova, O.A. and Rozenberg, G.V.

TITLE: Scattering of nonhomogeneous electromagnetic waves by spherical particles

PERIODICAL: Optika i spektroskopiya, v.14, no.1, 1963, 125-130

TEXT: It is noted that whereas existing theoretical calculations concerned with scattering by spherical particles assume that the plane electromagnetic wave incident on the particles is homogeneous, in practice it is frequently necessary to consider the scattering of plane nonhomogeneous waves, i.e. waves in which the plane of equal amplitudes differs from the plane of equal phases. It is shown that a nonhomogeneous plane wave can in general be looked upon as the superposition of two normal waves and the two components may be considered separately in the scattering calculation. A generalization of Mie's scattering theory is then given taking the above effect into account. It is shown that this type of scattering may lead to polarization effects which depend on the degree of nonhomogeneity of the incident wave and may occur, for example, in the case of

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total internal reflection from an absorbing medium. It is stated that these effects have not as yet been investigated experimentally. It is also noted that the effect may be present in the scattering of long radiowaves from the sporadic E-layer in the ionosphere.. The elliptical polarization of radiowaves scattered from the ionosphere may be due not only to the magnetic anisotropy of the medium but also to the effects mentioned above. Since the degree of nonhomogeneity of the incident wave varies with height, it may be possible to determine the height at which the scattering occurs by studying the polarization of the scattered wave.

SUBMITTED: October 30, 1961

S/053/63/079/003/002/003
B117/B186

AUTHOR: Rozenberg, G. V.

TITLE: Twilight phenomena: their nature and utilization in the study of the atmosphere

PERIODICAL: Uspekhi fizicheskikh nauk, v. 79, no. 3, 1963, 441 - 522

TEXT: This survey deals with the abundant publications on twilight phenomena which have been published by western and Soviet authors mainly after 1920, since it is only since then that experimental and theoretical studies of these penomena were started systematically. Earlier papers are a random collection of observations. Among other matters, the author's conceptions developed at the Laboratoriya atmosfernoy optiki Instituta fiziki atmosfery Akademii nauk SSSR (Laboratory of Atmosphere Optics of the Institute of Physics of the Atmosphere of the Academy of Sciences USSR) are summarized. These are mainly based on the results collected during years of studies at the Abastumanskaya astrofizicheskaya observatoriya AN Gruzinskoy SSR (Abastumani Astrophysical Observatory AS Georgian SSR) by T. G. Megrelishvili: general characteristic twilight phenomena; spectrophotometry and polarimetry of the twilight sky; geometry of solar rays

and their attenuation when passing through the atmosphere; luminescence of atmosphere in twilight; brightness of the twilight sky (twilight layer); effective boundary of the earth's shadow and its dependence on the structure of the atmosphere (twilight phases); color of the twilight sky; problem of multiple scattering (deep twilight and transition to night); the inverse problem of twilight theory and sounding of the atmosphere in twilight; differential method of solving the inverse problem and the method of the effective height of the earth's shadow. In conclusion the author points to the fact that the majority of twilight phenomena can be explained quantitatively with consideration of single light scattering only. The secondary scattering is an important but calculable correction..The data on luminescence and polarization of the twilight sky also supply important information on the state and the structure of the upper layers of the atmosphere in the region from ~20 - 120 km with sufficient reliability. Thus it is possible to determine not only the "climate" but also the "weather" in these layers by measurement from the earth. Since the data so obtained are equivalent, inaccuracy and reliability to those obtained by rocket sounding, it is appropriate to establish a twilight observation service around the globe. The work of the individual stations should be done regularly and according to a coordinated program. There are

Twilight phenomena: their ...

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B117/B186

60 figures, 1 table, and 207 references.

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B125/B112

3.1150

AUTHOR: Rozenberg, G. V.

TITLE: Study of the atmosphere of Venus by optical methods

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 148, no. 2, 1963, 300-302

TEXT: It is shown that optical methods yield reliable information about the atmosphere of Venus only if the effect of multiple scattering is taken into consideration. The current estimations of the portions of various gases in the atmosphere of Venus are unreliable because the absorption in the interior of the cloud layer has not been sufficiently taken into consideration. The effects conditioned by the optical properties of the clouds and of the atmosphere above the clouds may be separated by measurement of the intensity of absorption bands in the different zones of the Venus disk as a function of the Venus phase. According to the formula for the brightness coefficient at very low absorption, the surface ought also to shine through thick cloud layers. The blurred bright and dark spots on the Venus disk may perhaps be explained thus. Observations of these spots may be informative as to the

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rotation of Venus. Polarization of the light reflected by Venus depends only on the conditions of reflection off the clouds of Venus. Absorption in the cloud layer may be separated from that above the clouds by means of the Umov effect. The spectroscopic data on the temperature of the Venus atmosphere also require correction. The dark spots in ultraviolet photographs are caused not by the planet's surface, but by the different thicknesses of the cloud layers. Water clouds do not exist because of the extremely low intensity of the corresponding absorption bands.

ASSOCIATION: Institut fiziki atmosfery Akademii nauk SSSR
(Institute of the Physics of Atmosphere of the Academy of Sciences USSR)

PRESENTED: July 16, 1962, by V. A. Ambartsumyan, Academician

SUBMITTED: June 30, 1962

ROZENBERG, G. V.; ROMANOVA, L. M.; FEYGELSON, Ye. M.; SHIFRIN, K. S.

"Optical and radiative cloud properties."

paper presented at the Atmospheric Radiation Symp, Leningrad, 5-12 Aug 64.

FEYGEL'SON, Yeva Mikhaylovna; ROZENBERG,G.V., otv.red.

[Radiation process in stratified clouds] Radiatsionnye protsessy v sloistoobraznykh oblakakh. Moskva, Izd-vo "Nauka," 1964. 230 p. (MIRA 17:4)

ROMANOVA, L.M.; KOPROVA, L.I.; ROZENBERG, G.V., prof., otv. red.

[Actinometry and atmospheric optics; transactions] Aktinometriia i optika atmosfery; trudy. Moskva, Nauka, 1964. 385 p. (MIRA 18:1)

1. Mezhvedomstvennoye soveshchaniye po aktinometrii i optike atmosfery. 5th, Moscow, 1963. 2. Institut fiziki atmosfery AN SSSR, Moskva (for Rozenberg, Koprova).

L 52038-65 EWT(l)/EEC(m)/EWG(v)/EWA(h) Po-4/Pe-5/Pq-4/Pg-4/Pae-2/Peb/
Pi-4/Pl-4 GS/GW

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AUTHOR: Katulin, V. A.; Kozyrev, B. P.; Malkevich, M. S.; Faraponova, G. P.; 50
Rozenberg, G. V. (Professor) B41

TITLE: Airplane device for measuring radiation balance and some results of measurements

SOURCE: Mezhvedomstvennoye soveshchaniye po aktinometrii i optike atmosfery. 5th, Moscow, 1963. Aktinometriya i optika atmosfery (Actinometry and atmospheric optics); Trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 55-59

TOPIC TAGS: radiation pulsation, radiation thermoelectric element, terrestrial radiation, atmospheric radiation, upwelling radiation, downwelling radiation, albedo

ABSTRACT: Pulsations of shortwave and longwave radiation fluxes have been measured by a Kozyrev, small, vacuum, thermoelectric radiometer with a 180° scope. This device measured solar shortwave and terrestrial and atmospheric longwave radiation. Regions of strong absorption by water vapor were found and separated. The device measured upwelling and downwelling radiation fluxes during airplane flights above steppe and sea regions with clear and cloudy skies. A decrease in the downwelling flux was observed in the atmospheric layer 1—3 km above both regions. A very slight decrease in the

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L 52038-65

ACCESSION NR: AT5011156

downwelling flux was observed above the clouds in the 3—5-km atmospheric layer. A decrease in the upwelling flux was also observed in this layer. Pulsations of cloud albedo were measured and found to vary greatly. Orig. art. has: 3 figures and 1 table. [EG]

ASSOCIATION: Institut fiziki atmosfery AN SSSR, Moscow (Institute of the Physics of the Atmosphere, AN SSSR)

SUBMITTED: 25Nov64 ENCL: 00 SUB CODE: ES

NO REF SOV: 005 OTHER: 000 ATD PRESS: 4009

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L 52049-65 EWT(1)/EWG(v)/FCC/EEC(t) Pe-5/Pi-4 GS/GW UR/0000/64/000/000/0134/0135 39 38 B+1
ACCESSION NR: AT5011167

AUTHOR: Driving, A. Ya.; Mikhaylin, I.M.; Rozenberg, G.V. (Professor)

TITLE: Some data on the polarization of light scattered in the surface layer of the atmosphere *

SOURCE: Mezhvedomstvennoye soveshchaniye po aktinometrii i optike atmosfery. 5th, Moscow, 1963. Aktinometriya i optika atmosfery (Actinometry and atmospheric optics); trudy soveshchaniya. Moscow, Izd-vo Nauka, 1964, 134-135

TOPIC TAGS: atmospheric optics, atmospheric surface layer, light polarization, photometer, mist, fog

ABSTRACT: Observations of the components of the matrix of scattering characterizing the scattering function $f_{11}(\vartheta, \lambda)$ and the polarization of scattered light $f_{21}(\vartheta, \lambda)$ were made in September and October 1961 at Zvenigorod by the Institut fiziki atmosfery (Institute of Atmospheric Physics). Measurements were made in mist and fog with a DFS-14 diffraction spectrometer having a line dispersion on the second order of 6 A/mm in the region of wavelengths 4000-5500 A. The sensor was an FEU-19 photomultiplier; a searchlight was the light source. The same scattering volume for a parallel beam of rays was viewed by a photometer moving along rails in a range of scattering angles from 20 to 165°. A

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polaroid was mounted at the photometer aperture and could be oriented at several angles to the scattering plane. In the case of mist the polarization maximum was in the region of ϑ from 90 to 110°. The transition of mist into fog was characterized by the appearance of a large number of maxima in the region of scattering angles ϑ greater than 115° and less than 80°. Due to the large resolution of the instrument it was possible to detect clearly the interference character of the polarization curves in the case of a persistent (over 6 hours) fog of very fine water droplets. There is a maximum of positive polarization on the curves corresponding to a primary rainbow at ϑ = 142-143° and a secondary rainbow at ϑ = 136-137°; there also were peaks at ϑ = 130, 150 and 157° and a number of peaks at ϑ < 130°. In the case of an unstable fog the polarization curves show enlargement of fog droplets and the inverse process. In three hours of observations the maximum corresponding to the primary rainbow at ϑ = 145.0° was displaced to ϑ = 138.0-139.0° with a sharp increase in polarization and development of secondary peaks of equal magnitude at ϑ =120.0 and 145.0° and a somewhat greater peak at ϑ = 133.0°. At the end of the measurements, when the fog began to dissipate, the polarization curves began to be blurred: the main peak (primary rainbow) remained at ϑ = 140.0°, as did a smaller peak at ϑ = 150.0° and a third at ϑ = 120.0°. Several polarization curves obtained during a rain were characterized by a sharply expressed maximum of the primary and secondary rainbows and a very large number of secondary peaks for the region of scattering angles 115.0° < ϑ < 70.0°. Comparison of the f_{21}/f_{11} and f_{11} curves shows that the effects of scattering,

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ACCESSION NR: AT5011167

depending on the nature and size of the particles, are manifested considerably more strongly in data on the polarization of scattered light. It is noted that the full text of this article is to be published in an unspecified issue of Izvestiya Akademii nauk SSSR, Seriya geofizicheskaya, 1964.

ASSOCIATION: Institut fiziki atmosfery AN SSSR, Moscow (Institute of Atmospheric Physics, AN SSSR)

SUBMITTED: 25Nov64 ENCL: 00 SUB CODE: ES

NO REF SOV: 000 OTHER: 000

Card 3/3

ACCESSION NR: AP4030341 S/0049/64/000/003/0394/0407

AUTHORS: Malkevich, M. S.; Monin, A. S.; Rosenberg, G. V.

TITLE: The three dimensional structure of a radiation field as a source of meteorological information

SOURCE: AN SSSR. Izv. Ser. geofiz., no. 3, 1964, 394-407

TOPIC TAGS: artificial satellite, weather forecasting, radiation field, troposphere, stratosphere

ABSTRACT: The authors have pointed out the importance of world-wide observations in order to make satisfactory weather predictions, and they have found the use of artificial satellites for collecting meteorological data to offer both economy and geographic distribution of observational points. But, though the amount and universality of the information is increased, the type of information is qualitatively altered. The single source of information (for the lower layers of the atmosphere--the troposphere and stratosphere) is electrical radiation of various wavelengths reflected or emitted by the earth's surface and the surrounding atmosphere. Essentially the problem becomes a matter of spectral analysis of radiation

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ACCESSION NR: AP4030341

being lost by the planet. The authors describe the connection between structure of a radiation field and meteorological and other processes that have some effect on the radiation field. They describe the inhomogeneities of various scales in the radiation field and outline the physical origin of these inhomogeneities as well as the contribution they make in the recorded streams of radiation. They propose a method for computing atmospheric distortion when recording the structure of the underlying surface, and they also furnish definite recommendations for a method of observing the radiation field from artificial satellites. This involves principally a hemispherical receiver turned toward the earth and a device with the proper solid angle of view. Orig. art. has: 5 figures and 18 formulas.

ASSOCIATION: Akademiya nauk SSSR Institut fiziki atmosfery* (Academy of Sciences SSSR, Institute of Physics of the Atmosphere)

SUBMITTED: 20Jun63 DATE ACQ: 29Apr64 ENCL: 00

SUB CODE: ES NO REF SOV: 009 OTHER: 000

Card 2/2

KATULIN, V.A.; MALKEVICH, M.S.; MALKOV, I.P.; ROZENBERG, G.V.; YURKOVA, L.I.

Air-borne device for measuring the radiation balance and some results of atmospheric sounding. Trudy GGO no.166:282-294 '64.
(MIRA 17:11)

ACCESSION NR: AP4034796 S/0293/64/002/002/0257/0265

AUTHOR: Malkevich, M. S.; Malkov, I. P.; Pakhomova, L. A.; Rozenberg, G. V.; Faraponova, G. P.

TITLE: Determination of the statistical characteristics of radiation fields over clouds

SOURCE: Kosmicheskiye issledovaniya, v. 2, no. 2, 1964, 257-265

TOPIC TAGS: meteorology, cloud, atmospheric radiation, radiation field

ABSTRACT: A study has been made of the possibility of applying statistical analysis to fields of outgoing radiation for determining the structure of cloud formations. Computation of the structural parameters of the cloud cover is accomplished using aircraft measurements of radiation with narrow- and wide-angle instruments. The following conclusions are drawn from this preliminary investigation: 1. Statistical characteristics of the intensity of reflected radiation can be used for an objective analysis of clouds of various types and a reliable identification can be made on the basis of the full set of statistical parameters. 2. The most informative parameter is the spectral density of fluctuations of brightness, which is quite sensitive to a difference in the character of nonhomogeneities of different cloud types and at the same time is statistically stable. 3. An investi-

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L 17138-65 EEC(b)-2/EWT(l)/T ESD(c)/ESD(gs)/ESD(t)/IJP(c)
ACCESSION NR: AP5000554 S/0051/64/017/006/0927/0933

AUTHOR: Rozenberg, G. V.; Samsonov, Yu. B.

TITLE: Influence of dispersivity on the reflectivity of a thick layer of dispersed substance

SOURCE: Optika i spektroskopiya, v. 17, no. 6, 1964, 927-933

TOPIC TAGS: dispersed phase, reflection coefficient, light scattering, spectral analysis

ABSTRACT: On the basis of earlier deductions by one of the authors (Rozenberg, DAN SSSR v. 145, 775, 1962; Usp. fizich. nauk v. 69, 57, 1959) concerning the scattering matrix of a dispersive medium, the authors obtain approximate relations between the reflectivity of a thick layer of weakly absorbing dispersed medium and the particle dimensions, the absorption coefficient, and the dye concentration in the case of a colored dispersed substance, a colored dispersed medium, a dye absorbed by particles, and a mixture of particles of different dimensions and of different nature. Some of the results are compared with experiment. It is concluded that these relations can be used in the paint industry for technological problems hitherto solved only by trial and error. They can

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ACCESSION NR: AP5000554

also be used for commercial control of dimensions of the particles of a dispersed medium with a known absorption spectrum. In addition, the relations make it possible to account for the strong influence of the particle dimensions on the spectral composition of light reflected by a dispersed substance in the development of methods of spectral analysis of dispersed substances. They can also be used to calculate the reflection spectra of various geophysical objects such as cloud, snow, soil, paper products, opal glass, plastics, etc. Orig. art. has: 4 figures and 30 formulas.

ASSOCIATION: None

SUBMITTED: 07May63 ENCL: 00

SUB CODE: OP NR REF SOV: 008 OTHER: 002

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L 1883-66 FSS-2/EWT(1)/FS(v)-3/EEC(k)-2/FCC/EWA(d) TT/GS/GW
ACCESSION NR: AT5023563 UR/0000/65/000/000/0061/0061

AUTHOR: Rozenberg, G. V.; Tereshkova, V. V.

TITLE: The stratospheric aerosol as measured from a spaceship

SOURCE: Vsesoyuznaya konferentsiya po fizike kosmicheskogo prostranstva. Moscow, 1965. Issledovaniya kosmicheskogo prostranstva (Space research); trudy konferentsii. Moscow, Izd-vo Nauka, 1965, 61

TOPIC TAGS: aerosol, stratosphere, stratospheric aerosol, natural aerosol

ABSTRACT: The authors describe black and white motion pictures taken from "Vostok-6" showing about 500 km of the edge of the earth with its twilight aureole. The film was photographed from the shadow region on the Atlantic side with the terminator stretching across the southern tip of Africa. The photographs clearly show two bands of low brightness which indicate that there are two sharply defined, high-turbidity layers in the atmosphere. Photometric analysis shows that the first thin aerosol layer is at an altitude of 11.5 ± 1 km. The second layer is thicker and has a maximum at an altitude of 19.5 ± 1 km with a halfwidth of 5 km and a scattering coefficient $\sigma = 5 \cdot 10^{-3}$ km^{-1}. The results are compared with data from direct and indirect measurements (aircraft and balloon) of the aerosol concentration in the stratosphere,

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ACCESSION NR: AT5023563

and permitted determination of the chemical composition of the aerosols. The data obtained from the spaceship coincide with those obtained from aircraft, the aerosol concentration in both cases being determined with an accuracy of one order of magnitude. The volumetric concentration was larger by one order of magnitude than shown by aircraft measurements because hygroscopic aerosol particles in the stratosphere have a water or ice coating. The results indicate that the high-altitude aerosol layer is a source of condensation nuclei during the formation of nacreous clouds. The quantitative characteristics of the aerosol layer must be determined more accurately, especially the nature of its horizontal nonuniformity. [14]

ASSOCIATION: none

SUBMITTED: 02Sep65 ENCL: 00 SUB CODE: ES

NO REF SOV: 000 OTHER: 000 ATD PRESS: 4111

Card 2/2

L 34957-65 EWT(1)/EWG(v)/FCC/EEC(t) Pg-5/Pi-4 GW

ACCESSION NR: AP5007600 S/0362/65/001/001/0114/0118

AUTHOR: Bozh'yev, K. I. (Deceased); Driving, A. Ya.; Malkov, I. P.; Mikhaylin, I. M.; Rozenberg, G. V.; Turkin, G. D.

TITLE: Field-type spectrophotographic goniometer

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 1, no. 1, 1965, 114-118

TOPIC TAGS: goniometer, spectrophotographic goniometer, diffraction spectrometer, atmospheric optics, atmospheric physics, scattering matrix, atmospheric polarization, snow reflectivity

ABSTRACT: A spectrophotographic goniometer built at the Zvenigorodsk scientific base under G. V. Rozenberg and featuring a high measurement rate is described. It is organized around the DFS-14 diffraction photoelectric spectrometer which is discussed in detail. Provision for the use of two light receivers facilitates shifting from one spectral range to another. Test operation shows that despite its bulkiness, this arrangement is sufficiently convenient and reliable and makes possible a wide range of investigations, e.g., it has been used to measure the angular and spectral dependence of various components of the scattering matrix

Card 1/2

L 34957-65
ACCESSION NR: AP5007600

of atmospheric air under various meteorological conditions, to measure the spectra and polarization of the daytime and twilight sky, and to study the spectral and angular dependence of the reflective power of snow. Orig. art. has: 5 figures.

ASSOCIATION: Institut fiziki atmosfery, Akademiya nauk SSSR (Atmospheric physics institute, Academy of sciences, SSSR)

SUBMITTED: 27Apr64 ENCL: 00 SUB CODE: OP, ES

NO REF SOV: 003 OTHER: 000

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L 21029-66 FSS-2/EWT(l)/EEC(k)-2/EWA(d)/T IJP(c) [illegible]/GS/GW

ACCESSION NR: AT5023564 UR/0000/65/000/000/0062/0064

AUTHOR: Feoktistov, K. P.; Rozenberg, G. V.; Sandomirskiy, A. B.; Sergeyevich, V. N.; Sonechkin, D. M.

TITLE: Optical observations from the Voskhod spacecraft

SOURCE: Vsesoyuznaya konferentsiya po fizike kosmicheskogo prostranstva. Moscow, 1965. Issledovaniya kosmicheskogo prostranstva (Space research); trudy konferentsii. Moscow, Izd-vo Nauka, 1965, 62-64

TOPIC TAGS: Vostok, Voskhod, haze photography, cloud photography, cyclone, anticyclone, gegenschein, Glenn firefly

ABSTRACT: A number of optical observations were carried out by the Voskhod crew as a followup to experiments conducted by the Vostok-series capsules. Preliminary results of the following experiments are discussed: 1) photography of the haze which blankets the Earth's limb on the daylight side; 2) color photography of the dawn with the capsule on the night side; 3) observation over the planet's limb of a weak (pale-white with a yellow-green tone) glow region extending along and 2.5—3° above the horizon, and particularly evident against the polar glow; 4) observation of small luminescent particles (dust) first reported by Astronaut John Glenn; and

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ACCESSION NR: AT5023564 O

5) photography of the cloud cover (cyclone and anticyclone) against the water surface. Orig. art. has: 4 figures. [YK]

ASSOCIATION: none

SUBMITTED: 02Sep65 ENCL: 00 SUB CODE: ES, SV

NO REF SOV: 000 OTHER: 000 ATD PRESS: 4094

Card 2/2 BK

ROZENBERG, G.V.; MIKHAYLOV, Yu.A.

Some possibilities of determining the wind velocity above the ocean surface by observations from artificial earth satellites. Izv. AN SSSR. Fiz. atm. i okeana 1 no.3:282-290 Mr '65. (MIRA 18:5)

1. Institut fiziki atmosfery AN SSSR.

L 527[illegible]L/52726-65 EEO-2/EWG(j)/SS-2/EWG(r)/EWT(l)/FS(v)-3/EEC(k)-2/EEC(f)/EWG(v)/FCC/EEC(t)/T-2/EWG(a)-2/EWG(c)/EED(b)-3 Pn-4/Po-4/Pe-5/Pq-4/Pac-4/Pae-2/Pi-4 IJP(c) JT/GW

ACCESSION NR: AP5013175 UR/0362/65/001/004/0377/0385

AUTHOR: Rozenberg, G. V.

TITLE: Twilight studies of planetary atmospheres from spaceships

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 1, no. 4, 1965, 377-385

TOPIC TAGS: twilight halo, Stokes parameter, ozone layer, planetary atmosphere observation, spaceship, light scattering, space photography, space probe, meteorological probe

ABSTRACT: Study of solar radiation scattered during twilight from planetary atmospheres can produce more information on the optical structure of the atmosphere than observations carried out under daylight conditions because twilight studies can be extended to considerably higher altitudes and can yield much better altitudinal resolution (G. V. Rozenberg, Sumerki (Twilight), Fizmatgiz, 1963). While in the past, the twilight atmospheric probe theory has been developed in respect to observers on the earth's surface only, the increased use of space flight prompted the author to extend it to cases of external observation of the atmospheres of the earth and other planets. Several theoretical problems involving various observer

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L 52726-65
ACCESSION NR: AP5013175

positions, positions of the sun, and atmospheric conditions are defined, and formulas are derived for the use of observers. The author recommends simple photographic recording of the rim of the planet through appropriate light filters on photometrically standardized films as the best observation method. Orig. art. has: 50 formulas and 2 figures. [ER]

ASSOCIATION: Akademiya nauk SSSR. Institut fiziki atmosfery (Academy of Sciences SSSR, Institute of Physics of the Atmosphere)

SUBMITTED: 04Jul64 ENCL: 00 SUB CODE: AA, SV

NO REF SOV: 001 OTHER: 000 ATD PRESS: 4011

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L 52725-65 EEO-2/EWG(j)/FSS-2/EWG(r)/EWT(1)/FS(v)-3/EEC(k)-2/EEC(f)/EWG(v)/FCC/EWG(a)-2/EWG(c)/EWA(h) Pc-4/Pe-5/Pq-4/Pac-4/Pae-2/Pt-7/Peb/Pi-4 TT/GW

ACCESSION NR: AP5013176 UR/0362/65/001/004/0386/0394

60
59
8

AUTHOR: Rozenberg, G. V.; Nikolayeva-Tereshkova, V. V.

TITLE: Stratospheric aerosol according to spaceship measurements

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 1, no. 4, 1965, 386-394

TOPIC TAGS: spaceship atmospheric study, atmospheric aerosol distribution, Vostok 6 flight, stratospheric aerosol, space photography

ABSTRACT: On 17 June 1963 the spaceship Vostok-6 took pictures of the rim of the Earth surrounded by the twilight halo. The termination line was along the south end of Africa, and the picture was taken from the dark side of the Atlantic. One of the photometric altitude cross sections obtained in this way is shown in Fig. 1 of the Enclosure. On the basis of such pictures and the theory outlined in the paper, the vertical structure of the atmospheric aerosol layers has been determined. Two aerosol layers were observed (at 11.5 ± 1 and 19.5 ± 1 km). Estimates are made of the optical thickness of the upper layer and the effective radius of the particles, and the results are compared with those of balloon and aircraft measurements of aerosol concentrations. Further careful processing of the pictures is needed, especially with regard to the degree of horizontal inhomogeneity

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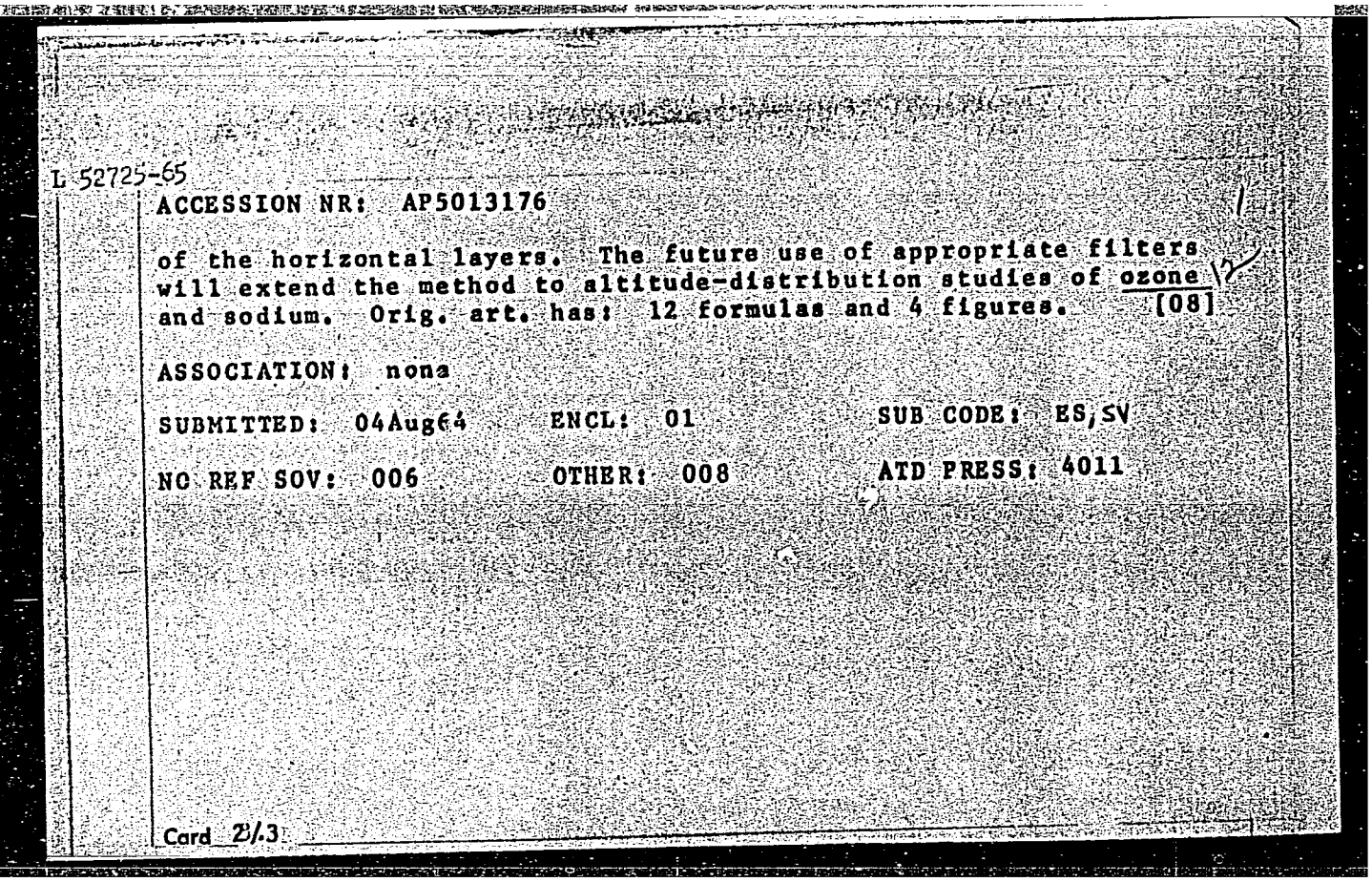

L 52725-65

ACCESSION NR: AP5013176

of the horizontal layers. The future use of appropriate filters will extend the method to altitude-distribution studies of ozone and sodium. Orig. art. has: 12 formulas and 4 figures. [08]

ASSOCIATION: none

SUBMITTED: 04Aug64 ENCL: 01 SUB CODE: ES,SV

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Card 2/3

L 52725-65
ACCESSION NR: AP5013176

ENCLOSURE: 01

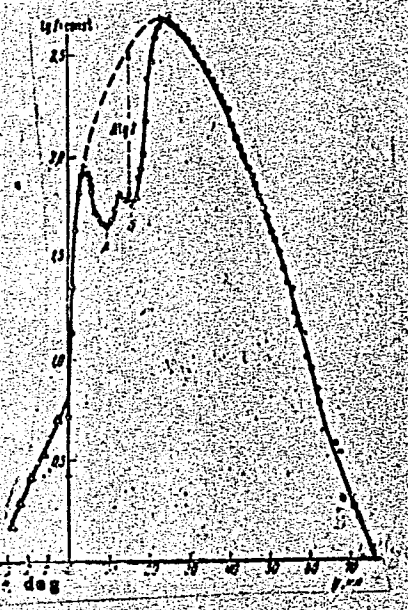

Fig. 1. Photometric altitude cross section

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L 9580-66 EWT(l)/FS(v)-3/FCC TT/GW

ACC NR: AP6001974 SOURCE CODE: UR/0362/65/001/012/1270/1278

AUTHOR: Rozenberg, G. V.; Sandomirskiy, A. B.; Trifonova, G. I. 3/ B

44,55 44,55 44,55

ORG: Academy of Sciences SSSR. Institute of Atmospheric Physics(Akademiya nauk SSSR. Institut fiziki atmosfery) 4/4,55

TITLE: Brightness profile of the day horizon of the planet Earth

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 1, no. 12, 1965, 1270-1278

TOPIC TAGS: atmospheric optics, brightness profile,twilight, satellite experiment, day sky brightness. 12,44,55

ABSTRACT: A simplified method is advanced for computing the brightness of the light aureole seen from a spaceship in the daytime at the limb of a planet. Though the planet Earth is emphasized, the method may be applied to other planetary atmospheres as well. The only case treated is one where all the regions of the atmosphere cut by the line of vision are in the hemisphere illuminated by the sun, i.e., the day horizon. The influence of various factors on the vertical and horizontal brightness structure of the light aureole is discussed. Specifically, the effect on the computations of two aerosol layers located at heights of about 11 and 19 km is shown graphically. Data obtained from spaceships on aerosol distribution during twilight were used. It was found that the aerosol layers caused a noticeable increase in brightness and could be observed from the spaceship as bands of enhanced

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L 9580-66

ACC NR: AP6001974

brightness stretching along the day horizon. The contrast between the bands is not great and varies with increased wavelength and the height of the layer. In general, photographs of the Earth's surface taken from the Vostok and Voskhod spaceships show that the part of the planet illuminated by the sun appears in the light blue haze of light scattered by the atmosphere. Spaceship investigations of this type open new possibilities of identifying and studying aerosol layers in the stratosphere, the height distribution of ozone, water vapor, sodium, and other atmospheric components. [DM]
Orig. art. has: 18 formulas and 5 figures.

SUB CODE: 04, 22 SUBM DATE: 16Jul65/ ORIG REF: 007/ OTH REF: 001
ATD PRESS: 4164

Card 2/2

L 10899-66 EWT(1)/FCC GW

ACC NR: AP6001975 SOURCE CODE: UR/0362/65/001/012/1279/1288

AUTHOR: Gorchakov, G. I.; Rozenberg, G. V.

ORG: Academy of Sciences, SSSR, Institute of Physics of the Atmosphere (Akademiya nauk SSSR, Institut fiziki atmosfery)

TITLE: Measurements of the light-scattering matrices in the ground layer of the atmosphere

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 1, no. 12, 1965, 1279-1288

TOPIC TAGS: atmosphere optics, light scattering, ground layer, photoelectric telepolarimeter, scattering matrix, atmospheric scatter, photometer, photometry

ABSTRACT: A description is given of the instrumentation and procedures used at the Zvenigorodskaya Station in the period 1959—1961 to investigate the component of the light-scattering matrix attributable to the air in the ground layer. The scattering matrix was studied in different regions of the spectrum and under different atmospheric conditions. Earlier determinations of the total scattering matrix and its angular dependence had been made by Rozenberg and associates in 1958 using photographic and visual photometry and subsequently confirmed in the more comprehensive investigations conducted by Pritchard and Eliott in 1960 using photoelectric instrumentation. (Pritchard, B. S., Eliott, W. G. Two instruments for atmospheric optics measurements. JOSA, 50, no. 3, 1960). The instrument used

Card 1/2 UDC: 551.521.3

L 10899-66

ACC NR: AP6001975

in the most recent Soviet experiments, as modified by N. D. Rudometkina, consisted of an illuminator with a control photometer and photoelectric telepolarimeter set at different angles. Measurements showed that average instrument error did not exceed ±3%, while the probable measurement error was ±10—15%. While the measurements did yield some information on the behavior of individual components of the scattering matrix, the results were considered inconclusive. Additional and more precise measurements were recommended. Orig. art. has: 7 formulas and 7 figures. [DM]

SUB CODE: 04/ SUBM DATE: 02Jul65/ ORIG REF: 008/ OTH REF: 006/ ATD PRESS: 4170

GC

Card 2/2